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DU MONT

SINE-WAVE OSCILLATOR
TYPE 348

348

Allen B. Du Mont Laboratories, Inc.

TECHNICAL PRODUCTS DIVISION

760 BLOOMFIELD AVENUE, CLIFTON, N. J., U. S. A.

TYPE 348
SINE-WAVE OSCILLATOR
Operating and Maintenance Manual

FIGURE 1. TYPE 348 SINE-WAVE OSCILLATOR

Allen B. Du Mont Laboratories, Inc.

TECHNICAL PRODUCTS DIVISION

760 BLOOMFIELD AVENUE, CLIFTON, N. J., U. S. A.

Part No. 67026431

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SPECIFICATIONS

1. PHYSICAL

Weight — 19 pounds
Height — 9⅞ inches
Width — 7 5/16 inches
Depth — 11 11/16 inches

2. ELECTRICAL

A. Frequency Ranges
0.9 cps to 510 kcps in six overlapping ranges:

0.9 to	10.5 cps — ×0.1
9 to	105 cps — ×1
90 to	1050 cps — ×10
900 to	10,500 cps — ×100
9000 to	105,000 cps — ×1kc
90,000 to	510,000 cps — 100-500kc

B. Calibration Accuracy
Below 10 cps: ±5%
Above 10 cps: ±(2% + ½ cycle)

C. Output Level
50 volts rms ±10%, or 2 watts maximum, whichever occurs first. Maximum output capability may be reduced at frequency extremes.

D. Output Source Impedance

Voltage Range	Impedance
50	Approximately 6 ohms in series with 1000μf
5	Approximately 6 ohms in series with 1000μf
0.5	55 ohms
0.05	6.2 ohms

E. Distortion
Full output: 0.3% maximum over most of the frequency range.
Output level under 3 db below maximum: 0.1% maximum over most of the frequency range, rising to 0.3% at 30 cps.

F. Frequency Stability up to 100 kc
Line voltage change 105 to 130 volts: ±0.5%.
Ambient temperature change 0 to +50° C: ±0.5%.

G. Output Level Variation with Frequency
±0.5 db referred to 1000 cps over the entire frequency range.

H. Hum and Noise Level
70 db below full output of each position of the step attenuator.

I. Input Power Required
117 volts ±10%, 50 to 400 cps, 110 watts.

DESCRIPTION

1.0 DESCRIPTION

The Du Mont Type 348 Sine-wave Oscillator is designed to provide an output in the frequency range of 0.9 cycles to 510 kilocycles divided into six overlapping ranges. The Oscillator is intended for general use as a stable, precision source of low distortion signals in the sub-audio, audio and ultrasonic frequency ranges, equally suitable for laboratory and production applications or for field testing and maintenance purposes.

The Type 348 Oscillator is contained in a small portable rectangular case equipped with a carrying handle. The electrical circuit consists of a Wien-bridge type resistance-capacitance tuned oscillator, with a feedback network and a thermal negative-resistance element to maintain operating stability over the entire frequency range. A push-pull cathode-follower output stage isolates the oscillator section from the load and serves to provide adequate output voltage.

Output frequency is controlled by the large calibrated dial and the associated FREQUENCY RANGE switch located on the front panel. The large dial is calibrated in two scale sections, the outer for the five lower ranges, the inner for the highest range only.

The output voltage level is adjusted by the two voltage controls. The VOLTAGE RANGE switch is set for the convenient operation of the logarithmically tapered VOLTAGE control. The four VOLTAGE RANGE switch settings are calibrated for an open-circuit load when the VOLTAGE control is located fully clockwise. The full-scale reading of the VOLTAGE control is then the voltage set by the VOLTAGE RANGE switch.

The power supply section consists of a full-wave rectifier circuit followed by a series passing-tube regulator circuit controlled by a dc amplifier stage. The ac power switch is located at the lower left of the front panel near the power-lamp indicator.

OPERATION

2.0 OPERATION

2.01 General

Connect the power cord to a source of 117 volts ac. Turn on the Type 348 Oscillator by means of the power switch on the front panel. The pilot lamp will provide the power-on indication.

In operation, the dc potential difference between the output termina's of the Oscillator is negligible. On the 50-volt range, some dc voltage may appear when the unit is operated into a high impedance or open circuit. This voltage has an equivalent source impedance of 20,000 ohms and will be negligible for low values of load resistance. On the lower ranges, this voltage is much less. To drive a high-impedance grid circuit, an external blocking capacitor is recommended.

To protect the output attenuator, the output should not be connected into a circuit with a potential greater than that shown in the chart below. Use an external blocking capacitor for more dc volts, but more ac cannot be tolerated.

Voltage Range Switch	Maximum Volts AC or DC in Load
50	50
5	5
0.5	3
0.05	1

2:02 Output Connections and Adjustments

Connect to the output terminals located on the front panel of the unit.

Select the frequency desired by means of the large dial and the FREQUENCY RANGE switch.

Use the VOLTAGE RANGE switch and the VOLTAGE control to provide the output level desired. Use the lowest convenient setting of the VOLTAGE RANGE switch, as this will result in minimum hum as well as the best vernier action of the VOLTAGE control. The output amplifier is capable of 2 watts into a 600-ohm resistive load, corresponding to 34.6 volts, 57.7 ma and +33 dbm, or 50 volts into a resistive load of 1200 ohms or higher.

Although the unit distortion is low at all voltages, at levels below the maximum, the distortion is further reduced. With a highly reactive load, some increase in distortion may occur at the higher output levels on the 50-volt range.

Due to the lack of reference markings on the VOLTAGE control, the use of an external attenuator is recommended to obtain outputs of less than 0.005 volt.

MAINTENANCE

3.0 MAINTENANCE

3.01 General

As the Type 348 Sine-wave Oscillator is a precision calibrated instrument, it is *not* recommended that any maintenance beyond tube replacement or similar routine servicing be attempted. If the unit does not perform satisfactorily, return the instrument to the Factory Service Department for repair and adjustment.

> CAUTION: THE PERFORMANCE OF THE UNIT IS AFFECTED BY THE POSITION OF SOME OF THE WIRING. DO NOT DISTURB ANY OF THE WIRING OR THE POSITION OF ANY COMPONENT.

The chassis of the Type 348 may be removed from its case by extracting the two screws located at the back of the cover.

It should be noted that in an atmosphere of high humidity, erratic behavior may be noticed on the lowest ranges. This will usually clear up after the unit has been operated for a while and the moisture has evaporated.

If the erratic behavior persists after the unit has been allowed to heat for a time, the tuning capacitor mounting board should be cleaned to remove conductive dust particles. Be careful not to change the adjustment of the trimmer capacitors near the tuning components.

3.02 Tube and Stabilizing Lamp Replacement

After replacement, check the Oscillator distortion on a distortion meter, selecting tubes or lamps causing the least distortion. Check the hum adjustment as described in Section 3.03 to follow.

High distortion on all ranges and levels is usually due to either the stabilizing lamp or to the oscillator 6AK6's, V2 or V3.

Distortion only at high output levels is usually due to one of the cathode-follower 12B4's, V7 or V8, or to one of the amplifier 6AK6's, V5 or V6. Distortion on the lowest frequency range only is usually due to grid current in the 6SJ7, V1.

3.03 Hum Adjustment

Heater-induced hum is minimized by the adjustment of the potentiometer, R55, connected across the filament circuit. When a tube is replaced, the setting of this control should be checked.

To do so, set the output frequency near 60 cycles and observe the voltage on a vacuum-tube voltmeter. Adjust the potentiometer for minimum beat.

The hum control is reached through an access hole at the rear of the unit near the power line cord.

Further hum reduction can sometimes be achieved by experimenting with ac power-plug reversal of the Type 348 and the equipment involved.

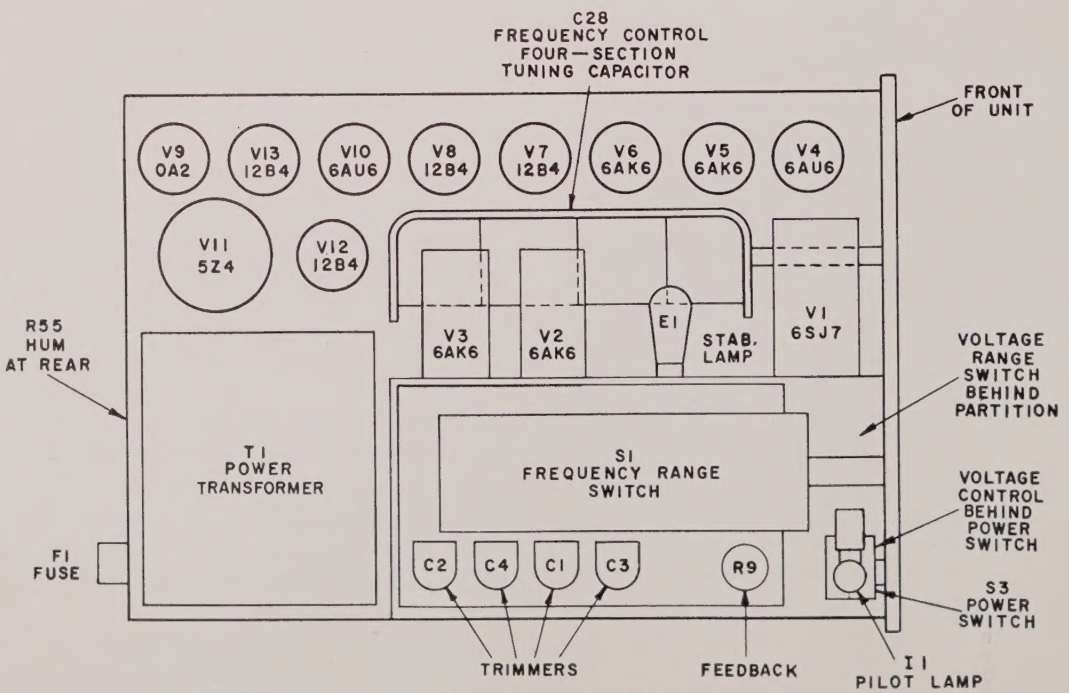
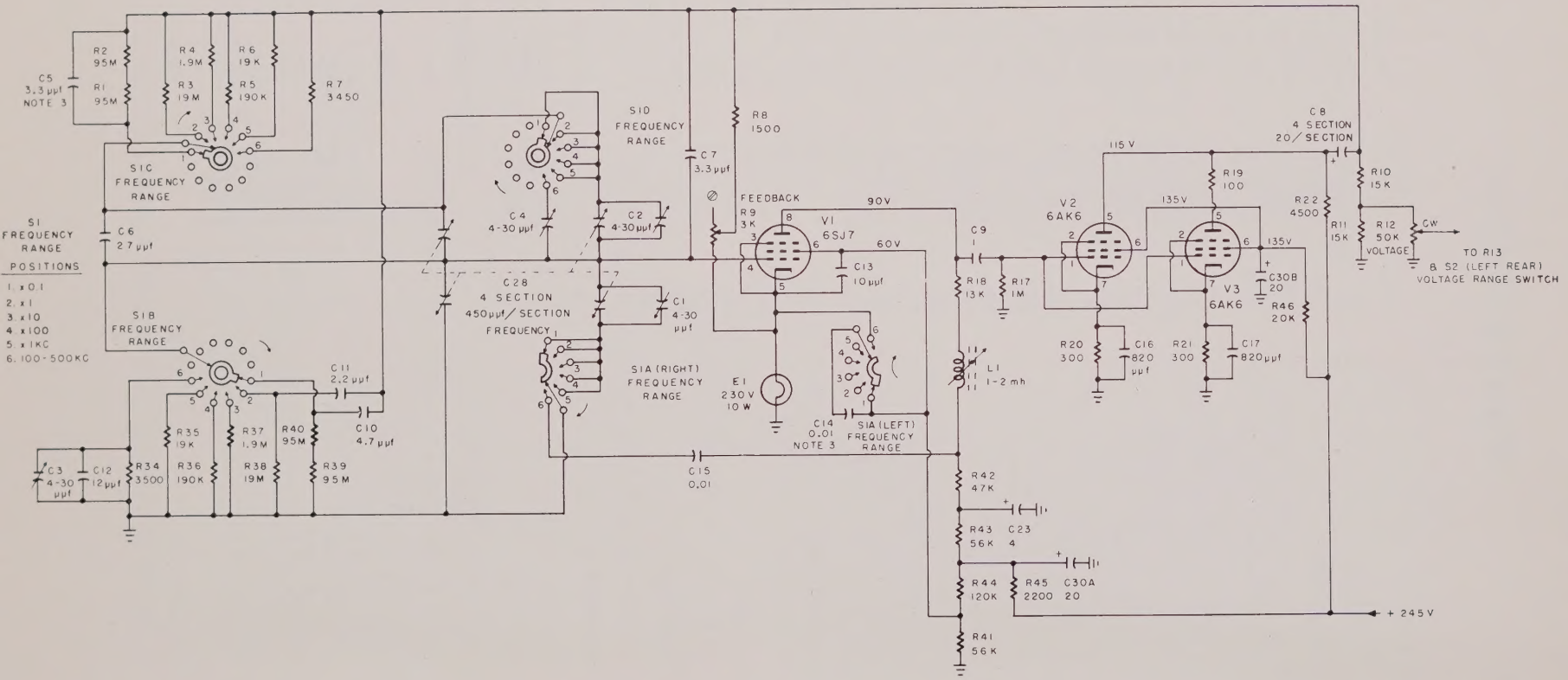


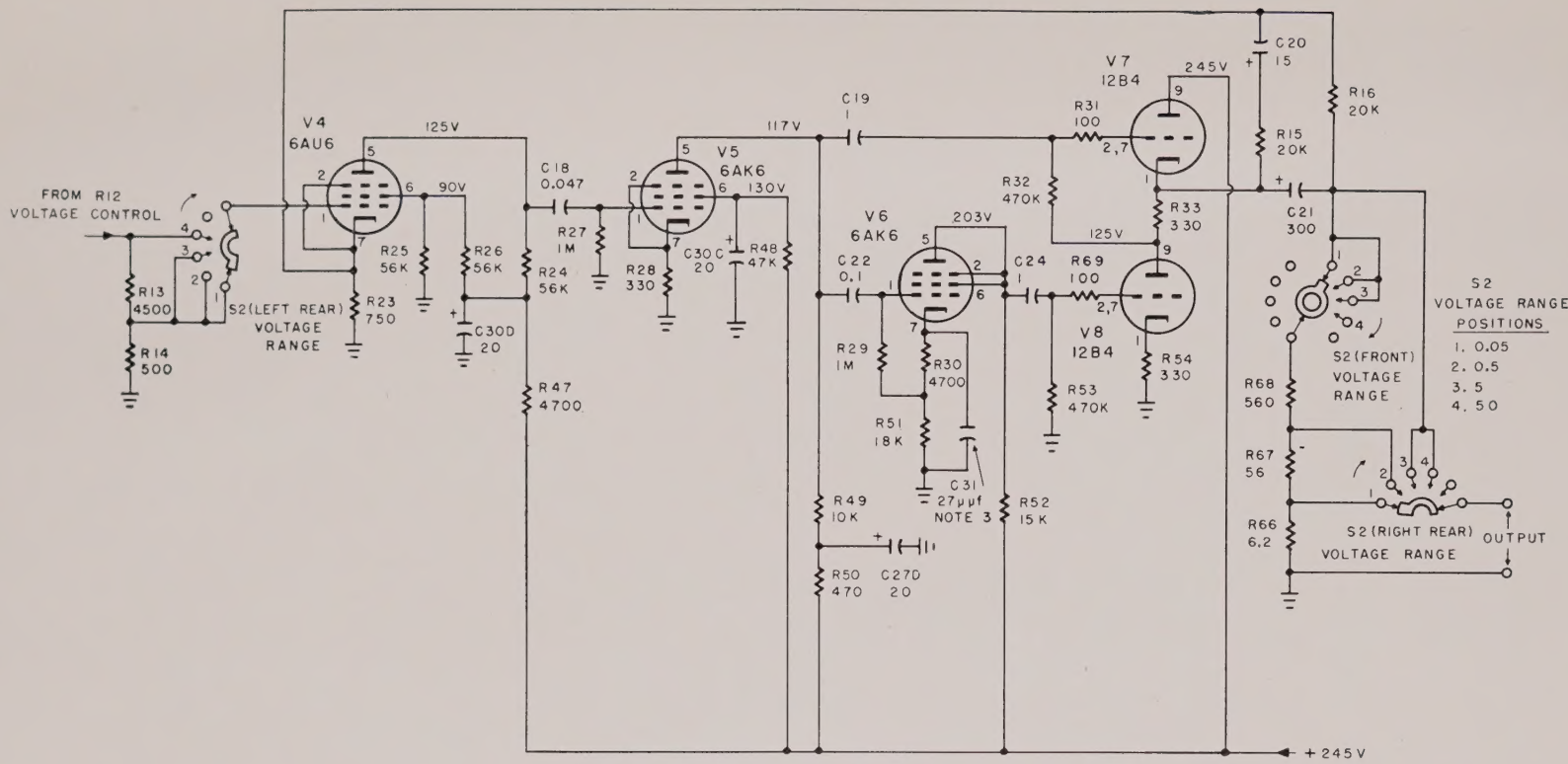
FIGURE 2. LEFT SIDE VIEW TYPE 348 SINE-WAVE OSCILLATOR

PARTS LIST

4.0 ELECTRICAL PARTS LIST

Symbol	Du Mont Part Number	Description
		CAPACITORS
		(Fixed, paper, ±20%, 500 V, unless otherwise specified)
C1 to C4	03003070	Variable, Ceramic, 4-30 μμf
C5	03167160	Ceramic, 3.3 μμf, ±0.25 μμf
C6	03165210	Ceramic, 27 μμf, ±0.25 μμf
C7	03167160	Ceramic, 3.3 μμf, ±0.25 μμf
C8	03011370	Electrolytic, 4 Section, 20 μf, 450 V
C9	03174540	1 μf, 400 V
C10	03153170	Ceramic, 4.7 μμf, ±0.5 μμf
C11	03167110	Ceramic, 2.2 μμf, ±0.25 μμf
C12	03167520	Ceramic, 12μμf, ±0.25 μμf
C13	03153250	Ceramic, 10 μμf, ±0.5 μμf
C14 & C15	03170970	0.01 μf, 400 V
C16 & C17	03174250	Ceramic, 820 μμf
C18	03165820	0.047 μμf, 200 V
C19	03174540	1 μf, 400 V
C20	03138620	Electrolytic, 15 μf, 150 V
C21	03127470	Electrolytic, 300 μf, 150 V
C22	03165840	0.1 μf, 200 V
C23	03172960	Electrolytic, 4 μf, 350 V
C24	03174540	1 μf, 400 V
C25 & C26	03170970	0.01 μf, 400 V
C27	03011370	Electrolytic, 4 Section, 20 μf, 450 V
C28	03127431	Variable, 4 Section, 12.6 μμf
C29	03165840	0.1 μf, 200 V
C30	03011370	Electrolytic, 4 Section, 20 μf, 450 V
C31	03165210	Ceramic, 27 μμf, ±0.025 μμf
		STABILIZING LAMP
E1	12000980	Incandescent, 230 Volts, 10 W
		FUSE
F1	11000980	1.6 Amperes, Slow Blow
		PILOT LAMP
I1	12001370	Incandescent, 7.5 Volts, 0.25 Ampere
		INDUCTOR
L1	21014700	Variable, 1-2 μh
		RESISTORS
		(Fixed, composition, ±10%, ½ W, unless otherwise specified)
R1 & R2	02240300	Film, 95M ohms, ±1%, 2 W
R3	02240200	Film, 19M ohms, ±1%, 1 W
R4	02244260	Film, 1.9M ohms, ±1%
R5	02243990	Film, 190K ohms, ±1%
R6	02243680	Film, 19K ohms, ±1%
R7	02243510	Film, 3.45K ohms, ±1%
R8	02241290	Film, 1500 ohms, ±5%
R9	01070350	Variable, Wire Wound, 3K ohms, ±20%, 2 W
R10 & R11	02030760	15K ohms, ±5%
R12	01022510	Variable, Wire Wound, 50K ohms, 4 W
R13	02243560	Film, 4500 ohms, ±1%
R14	02236710	Film, 500 ohms, ±1%
R15 & R16	02241500	Film, 20K ohms, ±5%
R17	02032130	1M ohms
R18	02030750	13K ohms, ±5%
R19	02031650	100 ohms
R20 & R21	02030350	300 ohms, ±5%
R22	02148480	Wire Wound, 4500 ohms, ±5%, 10 W
R23	02243440	Film, 750 ohms, ±1%
R24 & R25	02031980	56K ohms
R26	02034980	56K ohms, 1 W
R27	02032130	1M ohms
R28	02030360	330 ohms, ±5%
R29	02032130	1M ohms
R30	02031850	4700 ohms
R31	02031650	100 ohms
R32	02032090	470K ohms
R33	02033360	330 ohms, ±5%, 1 W
R34	02243520	Film, 3500 ohms, ±1%
R35	02243680	Film, 19K ohms, ±1%
R36	02243990	Film, 190K ohms, ±1%
R37	02244260	Film, 1.9M ohms, ±1%
R38	02240200	Film, 19M ohms, ±1%, 1 W
R39 & R40	02240300	Film, 95M ohms, ±1%, 2 W
R41	02031980	56K ohms
R42	02031970	47K ohms
R43	02031980	56K ohms
R44	02030980	120K ohms, ±5%
R45	02031810	2200 ohms
R46	02033790	20K ohms, ±5%, 1 W
R47	02031850	4700 ohms
R48	02033880	47K ohms, ±5%, 1 W
R49	02153510	Wire Wound, 10K ohms, ±5%, 10 W
R50	02031730	470 ohms
R51	02030780	18K ohms, ±5%
R52	02030760	15K ohms, ±5%
R53	02032090	470K ohms
R54	02033360	330 ohms, ±5%, 1 W
R55	01070310	Variable, Wire Wound, 100 ohms, ±20%, 2 W
R56	02032110	680K ohms
R57	02153400	Wire Wound, 2K ohms, ±5%, 20 W
R58 & R59	02031650	100 ohms
R60 & R61	02037890	10K ohms, 2 W
R62	02237660	Film, 2.2M ohms, ±1%
R63	02237650	Film, 2M ohms, ±1%
R64	02032050	220K ohms
R65	02032010	100K ohms
R66	02243400	Film, 6.2 ohms, ±1%
R67	02243420	Film, 56 ohms, ±1%
R68	02243450	Film, 560 ohms, ±1%
R69	02031650	100 ohms
		SWITCHES
S1	05011871	Frequency Range, Rotary
S2	05011881	Voltage Range, Rotary
S3	05001130	Power, Toggle
		TRANSFORMER
T1	20010430	Power
		TUBES
V1	25000270	6SJ7
V2 & V3	25000350	6AK6
V4	25000050	6AU6
V5 & V6	25000350	6AK6
V7 & V8	25009130	12B4
V9	25000300	0A2
V10	25000050	6AU6
V11	25001840	5Z4
V12 & V13	25009130	12B4
		CABLE
W1	50135710	AC Power Cord

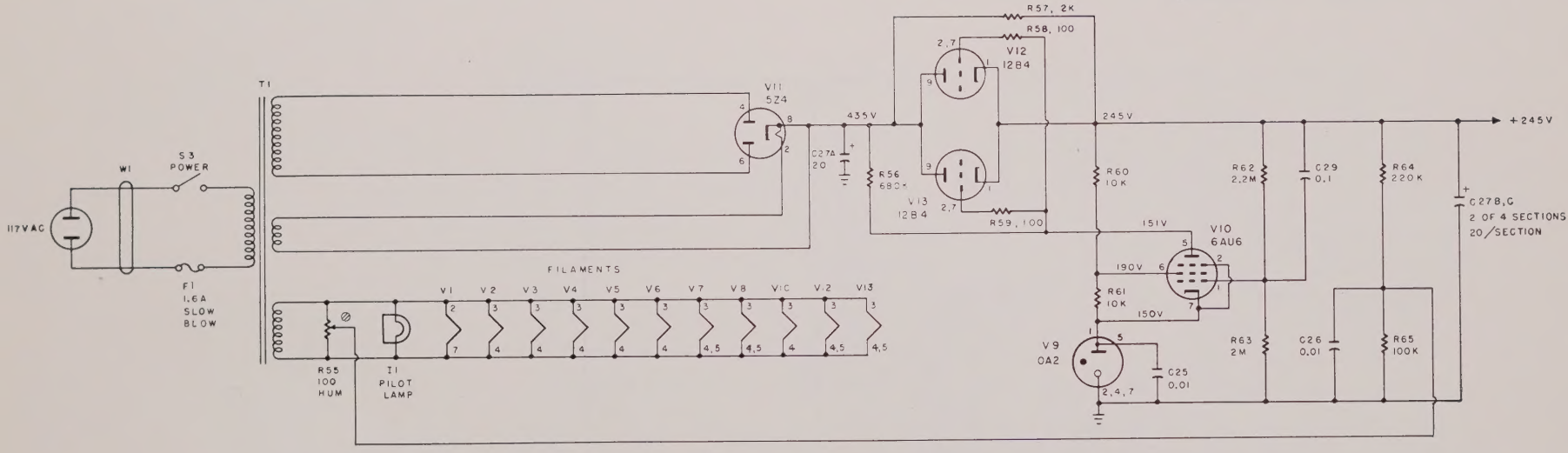

R2 95M
R1 95M
C5 3.3 µµf NOTE 3
R4 1.9M
R3 19M
R6 19K
R5 190K
R7 3450
S1C FREQUENCY RANGE
S1 FREQUENCY RANGE POSITIONS
1 x 0.1
2 x 1
3 x 10
4 x 100
5 x 1KC
6. 100-500KC
C6 2.7 µµf
S1B FREQUENCY RANGE
C11 2.2 µµf
C10 4.7 µµf
R35 19K
R37 1.9M
R40 95M
R34 3500
R36 190K
R38 19M
R39 95M
C3 4-30 µµf
C12 12 µµf
S1D FREQUENCY RANGE
C4 4-30 µµf
C2 4-30 µµf
C28 4 SECTION 450 µµf/SECTION FREQUENCY
C1 4-30 µµf
S1A (RIGHT) FREQUENCY RANGE
C15 0.01
R8 1500
C7 3.3 µµf
FEEDBACK
R9 3K
V1 6SJ7
90V
60V
C13 10 µµf
E1 230V 10W
C14 0.01 NOTE 3
S1A (LEFT) FREQUENCY RANGE
C9
R18 13K
R17 1M
L1 1-2 mh
R42 47K
R43 56K
C23 4
R44 120K
R45 2200
C30A 20
R41 56K
115V
V2 6AK6
R19 100
135V
V3 6AK6
C30B 20
R46 20K
R20 300
C16 820 µµf
R21 300
C17 820 µµf
C8 4 SECTION 20/SECTION
R10 15K
R22 4500
R11 15K
R12 50K VOLTAGE
CW
TO R13 B S2 (LEFT REAR) VOLTAGE RANGE SWITCH
+ 245 V



NOTES:

1. RESISTANCES ARE IN OHMS, K = THOUSAND, M = MILLION.
2. CAPACITIES ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
3. NOMINAL VALUES FOR C5, C14 AND C31 SHOWN. EXACT VALUES SET AT FACTORY.
4. SWITCHES ARE SHOWN IN FULLY COUNTERCLOCKWISE POSITION AS VIEWED FROM THE FRONT PANEL END. DECKS ARE LETTERED FROM THE FRONT PANEL END. ON FREQUENCY RANGE SWITCH S1, LONG ARM IS LOCATED IN POSITION SHOWN BUT AT FRONT OF DECK. ROTOR IS CONNECTED THROUGH TO REAR INTERNALLY.
5. VOLTAGES SHOWN ARE POSITIVE DC TO GROUND TAKEN WITH A SIMPSON MODEL 260 MULTIMETER OR EQUIVALENT.

SCHEMATIC OF CIRCUITS
DUMONT TYPE 348 SINE-WAVE OSCILLATOR
Reference Drawing No. 98001151-4, Issue 2



SCHEMATIC OF POWER SUPPLY
DUMONT TYPE 348 SINE-WAVE OSCILLATOR
Reference Drawing No. 98001151-4, Issue 2

WARRANTY AND SERVICE NOTICE
for
Industrial Type Cathode-ray Tubes and Instruments

DU MONT INSTRUMENTS

Each instrument manufactured by the Technical Products Division of Allen B. Du Mont Laboratories, Inc., is guaranteed to equal or exceed its published performance specifications. It is further guaranteed against defective materials (other than the cathode-ray tube) and workmanship for a period of one year from delivery date. Any defective instrument or an instrument that does not meet or exceed our specifications will, upon inspection by us, be repaired or replaced at our discretion should such defect appear within the guarantee period.

To register this guarantee, the enclosed guarantee card must be properly filled out and mailed to the factory immediately upon receipt of the equipment. Complete information is necessary. BOTH THE TYPE NUMBER AND THE SERIAL NUMBER OF THE INSTRUMENT MUST BE GIVEN ON THIS CARD.

Instruments must be examined immediately upon receipt, since claims for damage in transit will not be honored by the carrier unless prompt action is taken.

DU MONT CATHODE-RAY TUBES

Industrial type cathode-ray tubes manufactured by Allen B. Du Mont Laboratories, Inc., are guaranteed for 1000 hours of operation or for a six-month period from date of shipment, whichever expires first. Adjustments will be made on the merit of each individual claim because of the widely varying applications to which such tubes are subjected, and a tube which becomes defective during the guarantee period will be replaced ONLY AFTER INSPECTION AT THE FACTORY. Cathode-ray tubes returned under the guarantee, must be shipped with transportation paid.

BURNED-OUT HEATERS AND BROKEN GLASS ARE NOT COVERED BY THE TUBE GUARANTEE

To register a tube guarantee, the guarantee card enclosed with the tube must be filled out properly and mailed to the factory immediately upon receipt of the equipment. Complete information is necessary. TYPE NUMBER AND SERIAL NUMBER OF THE CATHODE-RAY TUBE MUST BE INCLUDED. The serial number of the tube will be found either on the glass stem of the electron-gun structure or on the bulb near the Du Mont brand. Tubes must be examined immediately upon receipt, since claims for damage in transit will not be honored by the carrier unless prompt action is taken.

CHANGES IN SPECIFICATIONS

The right is reserved to change the published specifications of equipment at any time and to furnish merchandise in accordance with current specifications without incurring any liability to modify equipment previously sold, or to supply new equipment in accordance with earlier specifications excepting under the classification of special apparatus.

SERVICE

In order to insure factory service under our guarantees, the guarantee cards enclosed with all instruments and tubes must be properly filled out and returned. In all cases where service or adjustment is requested, please write first to the factory giving complete information concerning the nature of the failure and describing the manner in which the equipment was used when failure occurred. THE TYPE NUMBER AND SERIAL NUMBER of the equipment must also be given. In this way, much time can be saved and unnecessary inconvenience often avoided. When writing in this respect, address:

Allen B. Du Mont Laboratories, Inc.
Technical Products Division
760 Bloomfield Avenue, Clifton, New Jersey

The Technical Products Division will then send to the customer, the written procedure for sending the instrument back to the factory. All equipment should be packed and shipped in accordance with this procedure; and identification tags should be attached to each tube or instrument.

REPLACEMENT PARTS

If it is necessary to order a replacement component from the factory, always give the type number and serial number of the instrument and refer to the component by its symbol designation and description on the circuit schematic. This will help to expedite service.

DUMONT

Additional copies of this manual may be secured at a cost of fifty cents each or five dollars per dozen copies; postpaid in the United States of America only.

Allen B. DuMont Laboratories, Inc.

TECHNICAL PRODUCTS DIVISION

760 BLOOMFIELD AVENUE, CLIFTON, NEW JERSEY